UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/619,633	07/14/2003	Steven Robert Hetzler	ARC9-2003-0016-US1	9167

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EXAMINER
JEAN GILLES, JUDE

ART UNIT	PAPER NUMBER
2143	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/619,633	HETZLER ET AL.
	Examiner	**Art Unit**
	Jude J. Jean-Gilles	2143

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>02 April 2007</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-26</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-26</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>14 July 2003</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

This office action is responsive to the Reply filed on 04/02/2007.

Response to Amendment

1.   In this amendment Claims 1-26 were amended. There are no newly added

claims. Claims 1-26 are pending. Claims 1-26 represent a method and apparatus for "

MULTIPATH DATA RETRIEVAL FROM REDUNDANT ARRAY".

Response to Arguments

2.   Applicant's arguments with respect to independent claims 1, and 14 have been

carefully considered, but are not deemed fully persuasive. Applicant's arguments are

deemed moot in view of the following new ground of rejection as explained here below.

The dependent claims stand rejected as articulated in the First Office Action and

all objections not addressed in Applicant's response are herein reiterated.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described
> as set forth in section 102 of this title, if the differences between the subject matter sought to
> be patented and the prior art are such that the subject matter as a whole would have been
> obvious at the time the invention was made to a person having ordinary skill in the art to which
> said subject matter pertains. Patentability shall not be negatived by the manner in which the
> invention was made.

4. **Claims 1-26** are rejected under 35 U.S.C. 103(a) as being unpatentable over

Talagala et al (Talagala), Patent No. 7,017,107 B2 in view of Zhang, U.S. Patent No

7,020,394 A1.

Regarding **claim 1**, Talagala teaches the invention substantially as claimed. a

Talagala discloses a pathway determination system for a data storage system having N

storage devices and more than N pathways for retrieving requested data from the data

storage system (fig. 2A; fig. 2B), the pathway determination system comprising:

a sorter <u>capable of</u> receiving a read request and separating the read request into

an appropriate segment size for sending to the storage devices of the data storage

system (column 10, lines 48-65; *note that the scrubbing operation here is similar to a*

read request in which the array controller, in the case of the invention, the sorter,

calculate the checksum for every unit of data refers to a segment of data size...);

an assigner <u>capable of</u> selecting a read permutation satisfying the received read

request, the selected read permutation being based <u>at least in part</u> on a predetermined

metric, and the assigner <u>being capable of</u> sending the selected read permutation to the

storage devices of the storage system (column 10, lines 48-67; column 11, lines 1-8; *it*

is important to acknowledge the teaching of the pre-calculated checksum which in the

case of the invention is the predetermined metric which is based on the read

permutation or the reconstructed data checksum); and

a collector <u>capable of</u> receiving the requested data from the N storage devices in

response to the selected read permutation being sent to the storage devices (column 4,

lines 1-10; *the disk controller plays the role of the collector, "receiving the read data*

from within a data range from at least one of the disk drives".

Applicants argue in the reply dated 04/02/2007, applicants argue that "While

Talagala discloses an interconnection fabric 157 that allows each node of the

interconnection fabric to have multiple possible paths to use when communicating with

another node, Talagala discloses nothing regarding determining a particular pathway

through the interconnection fabric other than the general concept that multiple

independent paths may allow a source node and a destination node to continue

communicating with each other even if one or more communication paths or nodes

between the source and destination nodes become inoperative. (See Talagala, column

7, lines 20-44.) Accordingly, Talagala only discloses a system that reads data from

where the data is known to be, not a pathway determination system."

In the same field of endeavor, Zhang discloses a method in which "...A method

of determining a shortest path between a source node and a destination node in an

optical network having plural network nodes interconnected with optical transmission

links, the method comprising: assigning an electronic node to each network node, the

electronic node representing an electronic switching fabric interconnecting optical-

electrical-optical (OEO) transmitters and receivers of the network node; assigning

optical channel nodes to each network node, each optical channel node representing

an optical cross-connect for an optical channel available at the network node... [see

Zhang, Abstract; column 6, lines 61-67; column 7, lines 1-6].

Accordingly, it would have been obvious to one of ordinary skill in the

networking art at the time the invention was made to have incorporated Zhang's

teachings of a method determining a particular pathway through the

interconnection fabric, with the teachings of Talagala, for the purpose of "ode

greatly reduces the number of links in the wavelength graph and significantly

increases the computational efficiency(see Zhang, abstract and summary of

invention). By this rationale **claim 1** is rejected.

Regarding **claim 2**, The combination Talagala-Zhang discloses the system according

to claim 1, wherein the assigner further <u>capable of</u> generating the read permutations

satisfying the received read request (column 10, lines 48-67; column 11, lines 1-8).

Regarding **claim 3**, The combination Talagala-Zhang discloses the system according to

claim 2, wherein <u>the assigner generates</u> the read permutations before the read request

is received (column 10, lines 48-67; column 11, lines 1-8).

Regarding **claim 4**, The combination Talagala-Zhang discloses the system according to

claim 1, wherein the assigner <u>comprises</u>: a permutation generator <u>capable of</u> generating

the read permutations (column 10, lines 48-67; column 11, lines 1-8); and a cost

calculator <u>capable of</u> calculating an expense of each permutation based on the

predetermined metric (figs. 7A-B, and 8; column 14, lines 29-50).

Regarding **claim 5**, The combination Talagala-Zhang discloses the system according to

claim 4, wherein the cost calculator <u>capable of</u> utilizing queue length information and

estimated current cost information, and wherein the permutation generator <u>capable of</u>

generating a reduced number of read permutations based <u>at least in part</u> on the queue

length information and the estimated current cost information (figs. 7A-B, and 8; column 14, lines 29-64).

Regarding **claim 6**, The combination Talagala-Zhang discloses the system according to claim 5, wherein the cost calculator is <u>capable of</u> calculating the expense of each permutation further based <u>at least in part</u> on performance information received from the storage devices of the storage system (column 14, lines 29-64).

Regarding **claim 7**, The combination Talagala-Zhang discloses the system according to claim 1, wherein the storage system comprises at least one failed storage device (column 9, lines 57-67; column 10, lines 1-13).

Regarding **claim 8**, The combination Talagala-Zhang discloses the system according to claim 1, wherein the metric is dynamically changed based <u>at least in part</u> on a change in operating conditions of the storage system (column 9, lines 31-56).

Regarding **claim 9**, The combination Talagala-Zhang discloses the system according to claim 8, wherein the metric is periodically changed based at least in part on operating conditions of the storage system (column 9, lines 31-56).

Regarding **claim 10**, The combination Talagala-Zhang discloses the system according to claim 1, wherein the metric is based at least in part on a current workload balance for the storage devices of the data system (column 14, lines 29-64).

Regarding **claim 11**, The combination Talagala-Zhang discloses the system according to claim 1, wherein the metric is based at least in part on an estimated delay before the requested data can be retrieved from the storage devices of the storage system (column 10, lines 25-41).

Regarding **claim 12**, The combination Talagala-Zhang discloses the system according

to claim 1, wherein the metric is based at least in part on a number of outstanding

requests in the queue of a storage device of the storage system (column 14, lines 29-

64).

Regarding **claim 13**, The combination Talagala-Zhang discloses the system according

to claim 1, wherein the metric is based at least in part on a total queue for all

outstanding requests that have been received by the storage system (column 14, lines

29-64).

Regarding **claim 14**, The combination Talagala-Zhang discloses a method for

determining a pathway for obtaining data stored in a data storage system having N

storage devices and more than N pathways for retrieving requested data from the data

storage system, the method comprising steps of:

receiving a read request from a requester (column 10, lines 48-65);

separating the read request into an appropriate segment and size for sending the

storage devices of the data storage system (column 10, lines 48-65; *note that the*

scrubbing operation here is similar to a read request in which the array controller, in the

case of the invention, the sorter, calculate the checksum for every unit of data refers to

a segment of data size...);

selecting a read permutation from possible read permutations satisfying the

received read request; sending the selected read permutation to the storage devices of

the storage system column 10, lines 48-67; column 11, lines 1-8); receiving the

requested data from the N storage devices in response to the selected read permutation

being sent to the storage devices; and returning the satisfied read request to the

requester (see Talagala; column 4, lines 1-10; see *Zhang, Abstract; column 6, lines 61-*

67; column 7, lines 1-6].).

Regarding **claim 15**, The combination Talagala-Zhang discloses the method

according to claim 14, further comprising a step of generating the read permutations

satisfying the received read request (column 10, lines 48-67; column 11, lines 1-8).

Regarding **claim 16**, The combination Talagala-Zhang discloses the method

according to claim 15, wherein the step of generating the read permutations is

performed before the read request is received (column 10, lines 48-67; column 11, lines

1-8).

Regarding **claim 17**, The combination Talagala-Zhang discloses the method

according to claim 15, further comprising a step of calculating an expense of each

permutation based at least in part on the predetermined metric (figs. 7A-B, and 8;

column 14, lines 29-50).

Regarding **claim 18**, The combination Talagala-Zhang discloses the method

according to claim 17, further comprising steps of: generating queue length information

and estimated current cost information, and generating a reduced number of read

permutations based at least in part on the queue length information and the estimated

current cost information (figs. 7A-B, and 8; column 14, lines 29-50).

Regarding **claim 19**, The combination Talagala-Zhang discloses the method

according to claim 18, wherein the step of calculating the expense of each permutation

is further based at least in part on performance information received from the storage

devices of the storage system (column 14, lines 29-64).

Regarding **claim 20**, The combination Talagala-Zhang discloses the method

according to claim 14, wherein the storage system includes at least one failed storage

device (column 9, lines 57-67; column 10, lines 1-13).

Regarding **claim 21**, The combination Talagala-Zhang discloses the method

according to claim 14, further comprising a step of dynamically changing the metric

based at least in part on a change in operating conditions of the storage system

(column 9, lines 31-56).

Regarding **claim 22**, The combination Talagala-Zhang discloses the method

according to claim 14, further comprising a step of periodically changing the metric

based at least in part on operating conditions of the storage system (column 9, lines 31-56).

Regarding **claim 23**, The combination Talagala-Zhang discloses the method according to claim 14, wherein the metric is based at least in part on a current workload balance for the storage devices of the data system (column 2, lines 4-26).

Regarding **claim 24**, The combination Talagala-Zhang discloses the method according to claim 14, wherein the metric is based at least in part on an estimated delay before the requested data can be retrieved from the storage devices of the storage system (column 10, lines 25-41).

Regarding **claim 25**, The combination Talagala-Zhang discloses the method according to claim 14, wherein the metric is based at least in part on a number of outstanding requests in the queue of a storage device of the storage system (column 14, lines 29-64).

Regarding **claim 26**, The combination Talagala-Zhang discloses the method according to claim 14, wherein the metric is based at least in part on a total queue for all outstanding requests that have been received by the storage system (column 14, lines 29-64).

Conclusion

5. This Action is made NON-FINAL. Any inquiry concerning this communication or

earlier communications from examiner should be directed to Jude Jean-Gilles whose

telephone number is (571) 272-3914. The examiner can normally be reached on

Monday-Thursday and every other Friday from 8:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, David Wiley, can be reached on (571) 272-3923. The fax phone number for

the organization where this application or proceeding is assigned is (703) 305-3719.

Any inquiry of a general nature or relating to the status of this application or

proceeding should be directed to the receptionist whose telephone number is (703) 305-

3900.

Jude Jean-Gilles

Patent Examiner

Art Unit 2143

DAVID WILEY
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100

JJG

June 08, 2007